water of crystallisation, which is present in 100 parts by weight of the solution. C shows the weight of the dissolved substance in the anhydrous condition. The numbers in this column may be calculated from those in the second column by multiplying by the combining weight of the anhydrous and dividing by that of the hydrated substance. Column D gives the weight of the body in the dry state, which is dissolved in 100 parts of water, and is calculated by multiplying the numbers in column C by 100 and dividing by 100—C :—

$$D = \frac{C \times 100}{100 - C}$$

Column E contains the number of atoms of the anhydrous salt in 100 parts by weight of water. The expression *atom* is here synonymous with *equivalent*. The atom of hydrogen is taken at $\frac{1}{100}$:—

$$E = \frac{D \times 100}{A \text{ (anhydrous)}}$$

F gives the volume of the solution ; 100 parts by weight of the water of the solution being taken as 100 volumes :—

$$F = \frac{D \times 100}{\text{spec. grav.}}$$

G indicates the specific gravities of the solutions. H contains the volumeter degrees, according to the scale of Guy Lussac, which correspond to the specific gravities :—

$$H = \frac{100}{G}$$

In column I are found the names of the observers, the temperature, and the references to the sources from which the numbers were obtained.

In this first table we find the various numbers corresponding to solutions of different states of concentration. In some cases the numbers are given for solutions at intervals of 1 per cent. of the salt, in others of 5 per cent., and in others of 10. The table commences with caustic alkalies, including ammonia, potash, and soda. Then follow the potassic and sodic carbonates, the chlorides of ammonium, potassium, sodium, lithium, aluminium, magnesium, calcium, strontium, barium, cadmium, and zinc, and stannous and stannic chlorides. The next section contains the bromides of potassium, sodium, lithium, magnesium, calcium, strontium, barium, cadmium, and zinc; whilst under the iodine compounds we find potassic, sodic, lithic, magnesic, calcic, strontic, baric, cadmic, and zincic iodides. Next comes sodic hyposulphate, and the sulphates of ammonium, potassium, sodium, manganese, and iron, the double sulphate of iron and ammonium, magnesic sulphate, potassia-magnesic sulphate, and the sulphates of zinc and copper. This series is followed by sections containing potassic chromate and bichromate, hydric disodic, and trisodic phosphates; hydric disodic, and trisodic arseniates; nitrates of potassium, sodium, magnesium, strontium, barium, and lead; chlorates of potassium and sodium ; bromates of potassium and sodium, iodates of potassium and sodium ; potassic ferrocyanide and ferricyanide; plumbic acetate; potassic and sodic tartrate; and Rochelle salt. The remainder of the table is devoted to the acids, and includes the following :—Hydrochloric, sulphuric, sulphurous, phosphoric, arsenic, nitric, acetic, tartaric, and citric.

After the table follows a chapter discussing the relations existing between the specific gravities of equally concentrated solutions ; and three others : On the change of volume produced by solution of salts ; on the change of volume produced on the dilution of aqueous solutions ; and on the change of volume produced by mixing different solutions.

The pamphlet concludes with a table extending over 19 pages, and containing the specific gravities of solutions, in most cases from 1 per cent. to nearly the point of saturation, though in some few instances they are given at every 5 per cent. This table gives, in addition to those of the substances above enumerated, the specific gravities of solutions of sugar and alcohol. Dr. Gerlach deserves the thanks of chemists and chemical manufacturers for undertaking the tedious labour of collecting and arranging in tables the large series of numbers which are found in this pamphlet.

SCIENTIFIC SERIALS

THE *American Journal of Science* for May, 1870, contains a good article "On a simple method of Avoiding Observations of Temperature and Pressure in Gas Analyses," by Wolcott Gibbs, M.D., Professor in Harvard University.

In absolute determinations of nitrogen and other gases, accurate observations of temperature and pressure are, in the ordinary methods of analysis, necessary, and when made require subsequent calculations which, when the analyses are numerous, become rather tedious. By the following simple method these observations may be altogether dispensed with, and the true weight or the reduced volume of the observed gas, obtained at once by a single arithmetical operation.

"A graduated tube, holding about 150 cubic centimetres, is filled with mercury, and inverted into a mercury trough. Two thirds or three fourths of the mercury are then displaced by air, care being taken to allow the walls of the tube to be slightly moist, so as to saturate the air. This tube may be called the companion tube; the volume of air which it contains must be carefully determined in the usual manner by five or six separate observations, taking into account, of course, all the circumstances of temperature and pressure. The mean of the reduced volumes is then to be found, and forms a constant quantity. The gas to be measured is transferred from the receiver in which it is collected, into a (moist) eudiometer tube, which is then suspended by the side of the companion tube, and in the same trough or cistern. Both tubes being supported by cords passing over pulleys, it is easy to bring the level of the mercury in the two tubes to an exact coincidence. The pressure on the gas is then the same in each tube. The temperature is also the same, as the tubes hang side by side in the room set apart for gas analyses, and are equally affected by any thermometric change. It is then only necessary to read off the volumes of the gas in the two tubes to have all the data necessary for calculating the weight of the gas to be measured. . . . . As the observed volume of the air in the companion tube is to the observed volume of the gas in the measuring tube, so is the reduced volume of the air in the first—previously determined as above—to the reduced volume of the gas to be measured. This method of course applies to the reduction of any gaseous mixture whatever to the normal pressure and temperature. . . . . In practice, a companion tube filled with mercury will last with a little care for a very long time. Even when filled with water I have found that excellent results may be obtained, and that the tube will last for some weeks. Williamson and Russell, in their processes for gas analysis, have employed a companion tube for bringing a gas to be measured to a constant pressure, but the application made above is, I believe, wholly new."

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 19.—"A Ninth Memoir on Quantics." By Prof. Cayley.

It was shown not long ago by Prof. Gordan that the number of the irreducible covariants of a binary quantic of any order is finite (see his memoir "Beweis das jede Covariante und Invariante einer binären Form eine ganze Function mit numerischen Coefficienten einer endlichen Anzahl solcher Formen ist," Crelle, t. 69 (1869), memoir dated 8th June 1868), and in particular that for a binary quantic the number of irreducible covariants (including the quantic and the invariants) is = 23, and that for a binary sextic the number is = 26. From the theory given in my "Second Memoir on Quantics," *Phil. Trans.* 1856, I derived the conclusion, which as it now appears was erroneous, that for a binary quintic the number of irreducible covariants was infinite. The theory requires, in fact, a modification, by reason that certain linear relations, which I had assumed to be independent, are really not independent, but, on the contrary, linearly connected together: the interconnection in question does not occur in regard to the quadric, cubic, or quartic ; and for these cases respectively the theory is true as it stands ; for the quintic the interconnection first presents itself in regard to the degree 8 in the coefficients, and order 14 in the variables ; viz., the theory gives correctly the number of covariants of any degree not exceeding 7, and also those of the degree 8, and order less than 14 ; but for the order 14 the theory as it stands gives a non-existent irreducible covariant

$(a, \ldots)^8(x, y)^{14}$; viz., we have, according to the theory, $5 = (10-6)+1$, that is, of the form in question there are 10 composite covariants connected by 6 syzygies, and therefore equivalent to $10-6=4$ asyzygetic covariants; but the number of asyzygetic covariants being $=5$, there is left, according to the theory, 1 irreducible covariant of the form in question. The fact is that the 6 syzygies being interconnected and equivalent to 5 independent syzygies only, the composite covariants are equivalent to $10-5=5$, the full number of the asyzygetic covariants. And similarly the theory as it stands gives a non-existent irreducible covariant $(a, \ldots)^8(x, y)^{20}$. The theory being thus in error, by reason that it omits to take account of the interconnection of the syzygies, there is no difficulty in conceiving that the effect is the introduction of an infinite series of non-existent irreducible covariants, which, when the error is corrected, will disappear, and there will be left only a finite series of irreducible covariants. Although I am not able to make this correction in a general manner so as to show from the theory that the number of the irreducible covariants is finite, and so to present the theory in a complete form, it nevertheless appears that the theory can be made to accord with the facts; and I reproduce the theory, as well to show that this is so as to exhibit certain new formulæ which appear to me to place the theory in its true light. I remark that although I have in my Second Memoir considered the question of finding the number of irreducible covariants of a given degree θ in the coefficients but of any order whatever in the variables, the better course is to separate these according to their order in the variables, and so consider the question of finding the number of the irreducible covariants of a given degree θ in the coefficients, and of a given order μ in the variables. This is, of course, what has to be done for the enumeration of the irreducible covariants of a given quantic; and what is done completely for the quadric, the cubic, and the quartic, and for the quintic up to the degree 6 in my Eighth Memoir (*Phil. Trans.* 1867.) The new formulæ exhibit this separation; thus (Second Memoir, No. 49), writing a instead of x we have for the quadric the expression $\frac{1}{(1-a)\ (1-a^2)}$, showing that we have irreducible covariants of the degrees 1 and 2 respectively, viz., the quadric itself, and the discriminant: the new expression is $\frac{1}{(1-ax^2)\ (1-a^2)}$, showing that the covariants in question are of the actual forms $(a, \ldots \between x, y)^2$ and $(a, \ldots)^2$ respectively. Similarly for the cubic, instead of the expression No. 55, $\frac{1-a^6}{(1-a)\,(1-a^2)\,(1-a^3)\ 1-a^4)}$, we have $\frac{1-a^6x^6}{(1-ax^3)\ (1-a^2x^2)\ (1-a^3x^3)\ (1-a^4)}$, exhibiting the irreducible covariants of the forms $(a, \ldots \between x, y)^3$, $(a, \ldots)^2\ (x, y)^2$, $(a\ \ldots)^3\ (x, y)^3$, and $(a, \ldots)^4$, connected by a syzygy of the form $(a, \ldots)^6\ (x, y)^6$; and the like for quantics of a higher order.

In the present Ninth Memoir I give the last-mentioned formulæ; I carry on the theory of the quintic, extending the Table No. 82 of the Eighth Memoir up to the degree 8, calculating all the syzygies, and thus establishing the interconnections, in virtue of which it appears that there are really no irreducible covariants of the forms $(a, \ldots)^8(x, y)^{14}$, and $(a, \ldots{}^8 \between x, y)^{20}$. I reproduce in part Prof. Gordan's theory so far as it applies to the quintic; and I give the expressions of such of the 23 covariants as are not given in my former memoirs; these last were calculated for me by Mr. W. Barrett Davis, by the aid of a grant from the Donation Fund at the disposal of the Royal Society. The paragraphs of the present memoir are numbered consecutively with those of the former memoirs on Quantics.

"On the Chemical Activity of Nitrates." By Edmund J. Mills, D. Sc.

"On the relative Duration of the component parts of the Radial Sphygmograph Trace in Health." By A. H. Garrod.

Anthropological Society, May 19.—Dr. Berthold Seemann, V.P., in the chair. Mr. Henry F. Chorley read a paper on "Race in Music." The author, after remarking on the vast range of the subject for treatment in the compass of a single paper, proceeded to point out the difficulties that stood in the way of determining what is and what is not truly national music, one great difficulty consisting in the inaccuracies of notation. Notation being comparatively a modern art and the only means by which musical ideas can be transmitted, we are very much in the dark as to the advance made by the ancients in the art of music. Confining himself chiefly to the modern development of music, Mr. Chorley argued that new and original melody is far less common than is generally supposed. By the simple variation of *tempo*, implying some change in accentuation, a melody can be so entirely transformed as to lose its original character. Genuine, fresh, national music is, again, comparatively rare, and its character has always been most marked whenever intercourse has been the most restricted. Passing from the more limited subject of national music to the broader question of race-elements in music, the author illustrated the great distinction which exists between the Asiatic and the European development of the art; in the former it is confined to rhythm, and seldom includes beauty of sound or symmetry of form. In strong contrast to the Oriental ideas of music were cited those of the north of Europe, viz., Norway, Sweden, Denmark, and Russia. In the opinion of the author those people take the highest place as melodists. It should as a fact be noted that with few exceptions those northern airs are in minor keys, which might be taken as an expression of, rather than a protest against, the gloom of the climate and scenery, were it not that the same characteristic largely obtains among inhabitants of the torrid zone. The sense of musical rhythm seems as distinctly marked among different peoples as varieties of physiognomy; for instance, the Peninsular melodies are only characteristic when they are in triple time, the airs in common time being essentially mawkish and pointless, owing such individuality as they have to the sleepy, voluptuous delivery of the executant. On the other hand, the music of France lies essentially in the direction of squared music towards what is piquant as distinct from what is undulating. In treating of the subject of Race in Music the author could not but draw attention to a phenomenon which is of universal recurrence, namely, the demarcation not merely of race but also of sex in the art, be its stages of culture or civilisation ever so primitive, ever so mature. The absence of musical inventive genius in woman is most curious and inexplicable, and offers another signal illustration of the contradictions and inconsistencies which mark music beyond any other art. While women have achieved distinction and often great success in literature, painting, sculpture, architecture, and science, and while they are unsurpassed as interpreters of the drama and of the art of music, not a solitary female composer of originality or even of repute is known to the historical or critical observer. Mr. Dannreuther illustrated the paper by numerous examples on the pianoforte.

Entomological Society, June 6.—Mr. A. R. Wallace, president, in the chair. Mr. F. V. Jacques, of Bristol, was elected a member. A collection of insects sent to the Society by Mr. Henry Ansell, from Kinsembo, S.W. coast of Africa, was exhibited; and another collection from Tugela, Natal, was exhibited by Mr. W. Warwick King. Living specimens of *Ateuchus*, from Venice, were shown by Mr. S. Stevens; and a gynaniromorphous *Brachycentrus*, from Cheshunt, was exhibited by Mr. M'Lachlan. Communications were made by Major Munn, on the Honey-Bee, by Mr. A. G. Butler, on the possible identity of *Argynnis Niobe* with *A. Adippe*, and by Mr. G. R. Crotch on the Genera of *Coleoptera* studied chronologically (part 2, from 1802 to 1821.)

Ethnological Society, June 7.—Dr. A. Campbell, V.P., in the chair. R. H. Tiddeman, B.A., F.G.S., was announced as a new member. Professor Huxley, LL.D., F.RS., President, read a paper "On the chief modifications of mankind, and their geographical distribution." After pointing out those physical characters which are of the greatest value in distinguishing the several modifications—such as colour, character of hair, and form of skull—the author proceeded to describe five distinct types of mankind: 1. The *Australioid*, with slender limbs, dark brown skin, black wavy hair, strong brow-ridges, and long skull; this type is found throughout Australia among the hill tribes of the Dekhan in India, and formerly in the Valley of the Nile. 2. The *Negroid*, with dark skin, black frizzled hair, and long skull; a group which includes the Negroes and Bushmen of Africa, and the Negritos of New Guinea, Tasmania, &c. 3. The *Xanthochroic*, with fair skin and blue eyes, distributed through Iceland, Eastern Britain, Scandinavia, North and Central Germany, and extending through Eastern Europe into Asia, as far as North-west India, and found also in the North of Africa. 4. The *Melanochroic*, a type with dark complexion, occupying an area situated between the Xanthochroic and Australioid peoples; and 5. The *Mongoloid*, a large and somewhat ill-defined group extending throughout Central and Northern Asia, the two Americas, and Polynesia. The paper was illustrated by a large coloured map, showing the distribution of these five groups and their subdivisions. Among those who took part in the subsequent discussion were Mr. George Campbell, Mr. A. R. Wallace, Mr. E. G. Squier, Dr. Ray, Mr. Luke Burke, and Mr. Dardy.—Mr. Squier exhibited a large collection of drawings, plans, and photographs of localities of interest in Peru.

Zoological Society, June 9.—George Busk, V.P., in the chair. The Secretary read some notices of the principal additions to the Society's menagerie during the month of May, and called particular attention to a deer sent home from Singapore by order of H.R.H. the Duke of Edinburgh. This animal appeared to belong to a new species, and was proposed to be called *Cervus alfredi.*—Professor Newton, V.P., exhibited a series of skins of the large falcon found in Alaska and sent to this country for examination by the Smithsonian Institution, and referred them to the *Falco islandicus* of Gmelin.—Mr. Gould exhibited and made remarks upon some skins of British water-ouzels.—Mr. R. Swinhoe read a series of zoological notes made during a journey from Canton to Peking and Kalgan. Mr. Swinhoe's remarks contained descriptions of several new species of mammals and birds, amongst which were a new hedgehog, proposed to be called *Erinaceus dealbatus*, and a new species of dwarf swan, for which the name *Cygnus davidis*, after M. le Père David, its discoverer, was proposed.—Mr. R. Swinhoe also read a paper containing notes on certain reptiles and batrachians collected in various parts of China.—Mr. R. B. Sharpe read a paper on the Ornithology of Madagascar, based upon a collection recently formed by Mr. A. Crossley, in the neighbourhood of Noce Vola, in the north-western portion of the island. Two new species were discriminated, and proposed to be called *Ceblepyris major* and *Corethrura insularis.* Two species—viz., *Bernieria crossleyi* of Grandidier, and *Ellisia madagascariensis* of Hartlaub—were likewise generically separated, under the respective names of *Mystacornis* and *Oxylabes.*—Dr. John Hawkes, F.Z.S., communicated a note on a case of *hernia ventriculi* in a common canary.—Mr. D. G. Elliot exhibited and pointed out the characters of two new species of pheasants from the province of Yarkand, proposed to be called *Phasianus shawii* and *P. insignis*; also a well-marked permanent variety of *P. torquatus* from the Island of Formosa, proposed to be called *P. formosanus.* Mr. Elliot also made remarks on the affinities of the known species of true *Phasianus*, and pointed out their geographical distribution.—A communication was read from Mr. A. Sanders, F.Z.S., containing notes on the myology of a Geckoid lizard, *Platydactylus japonicus.*—A communication was read from Mr. Gerard Krefft, C.M.Z.S., of Sydney, containing a preliminary account of the skeleton of a rare whale, probably identical with *Dioplodon sechellensis*, recently obtained in the Australian seas, near Lord Howe's Island.—Messrs. Sclater and Salvin communicated a synopsis of the birds of the family of *Cracidæ.* The authors proposed to divide this family into three sub-families—the *Cracinæ*, *Penolopinæ*, and *Oreophasidinæ.* Of the first of these twelve species were recognised, and of the second thirty-eight, while the third contained only one representative. One species of Guan was described as new, and proposed to be called *Ortalida erythroptera.*—A communication was read from Professor Barboza du Bocage, F.M.Z.S., containing a description of the young of *Pelecanus sharpii.*—Dr. A. Günther communicated an account of the species of tailless batrachians, recently added to the collection of the British Museum, amongst which was a new diminutive frog, recently discovered by Dr. Cunningham in Fuegia, and proposed to be called *Nannophryne variegata.*—Dr. J. Murie read a paper on the anatomy and osteology of the Saiga (*Saiga tartarica*), founded on examples of this mammal that had lived in the Society's Gardens. The conclusions arrived at by the author as to the systematic position of the Saiga were, that this animal cannot be well included in any of the subdivisions of the ruminants hitherto established, but constitutes a form intermediate between the sheep and the antelope.

Victoria Institute, April 25.—Rev. Dr. Thornton, vice-president, in the chair. A paper was read on "Comparative Psychology," by Mr. E. J. Worshead. The following gentlemen took part in the discussion:—Rev. C. A. Row, Rev. J. B. Ouran, Dr. C. Haughton, Mr. Reddie, Rev. Sir S. Marsh, Rev. C. Graham, and the chairman.

Brighton and Sussex Natural History Society, June 9.—Mr. Sewell, vice-president, in the chair. A paper on Diptera and their Wings, by Mr. Peake, was read, in the absence of that gentleman, by Mr. Wonfor, Hon. Sec. While wings are common to the whole order of insects, the Diptera consist entirely of two-winged flies; but instead of a second or hinder pair, they have little thread-like bodies, terminated by knobs and called *halteres*, originally considered balancers, supposed now by some to be *olfactory* organs and by others organs of *hearing*. From many points of resemblance he thought they were analogous to the hind wings of insects, and that at present their special use had not been ascertained. Besides the halteres they had also winglets (*alulæ*) which were thought to be only appendages to the fore-wings. Among the Diptera three classes of fliers were found, differing in the form of their bodies and shape of their wings; first, the slender flies, such as gnats, having long bodies, narrow wings, and long legs, but without winglets; secondly, those whose bodies, though slender, are more weighty, as the *Asilidæ*, having larger bodies, shorter legs, and very minute winglets; lastly, those like the house-fly, with short, thick, and often very heavy bodies, furnished with proportionate wings, shorter legs, and conspicuous winglets. From these circumstances it might be inferred that the long legs of the light-bodied flies acted as rudders, while the winglets of the heavier bodied flies assisted the wings in flying. The wings might be described as transparent membranous organs, consisting of two laminæ united by veins or nervures, and upon their arrangement and the form of the antennæ the distinguishing characters of the Diptera were formed. The several parts of the wings and nervures and their differences, as seen in the great groups *Nemocera* and *Brachycera*, were next pointed out, and the paper illustrated by drawings and microscopical preparations of wings.

TRURO

Royal Institution of Cornwall, May 17.—The annual meeting of this society was held in the Council-room, Truro, Mr. J. Henwood, F.R.S., president, in the chair. Mr. H. M. Whitley read a paper contributed by Sir. F. M. Williams, M.P.: "Recent Observations on the Subterranean Temperature of Clifford Amalgamated Mines." This gave the result of various observations made during the past fifty years, and, finally, those made by Captain Gilbert previous to ceasing the deep workings some weeks since. Then at 224 fathom level, being 279 fathoms from the surface, the highest temperature recorded was 123°·5; and at 245 fathom level, or 300 fathoms from the surface, the highest was 125°.

Mr. W. Pengelly read a paper, entitled "Notes on the Archæology and Geology of Devon and Cornwall." A difficulty formerly existed in relation to the Devonian series of rocks, for while in the northern part of the area over which it extended there were found fish, in the south there were only sponges and mollusks. The late Mr. Jonathan Couch discovered in 1843 some fossils which he thought fish, but which Professor McCoy in 1857 pronounced to be sponges. The matter dropped till in 1857 he himself submitted to Mr. W. H. Baily a fossil found at Hannafore point, near Looe, and it, with a number of the same kind collected, were pronounced, on the authority of Mr. Simmons and Professor Huxley, to be ichthyolitic. The next point to which he specially wished to direct attention was the rock joints, of which they had two series, one running east and west, and the other north and south, and of which the one that crossed the other was naturally the more recent. Of the age of these joints few indications had been observed. At the eastern shore of Torbay, however, where both these systems were to be observed, it was evident that they were in existence before the close of the New Red Sandstone era, because their fissures were filled with dykes of that rock. The east and west dykes were faulted and traversed by veins of carbonate of lime, which came up on either side to the north and south dykes, but did not cross them. This showed that a considerable time must have elapsed after the formation of the first system of joints before the second. He would commend this subject to the geologists of the county. Next he would refer to the lower Silurian fossils of the Dodman district. At Budleigh Salterton there was a remarkable collection of quartzite pebbles which contained fossils, of which the analogues were to be found in the rocks of Normandy. However, he objected to being beholden to Normandy if he could trace the pebbles to a source nearer home; and he should be delighted if some energetic young Cornishman would devote himself to the elucidation of these quartzite pebbles. Thirdly, whence were the flints on our western strand derived? There was no deposit of flints to the south of the Teign; the course of the shingle could be traced along the coast from the west to the east; and yet there was an abundance of flints, not only in the present beaches all round Cornwall, but in the raised beaches. It would be a comparatively easy but valuable task to ascertain the relative abundance of flints at various points. It would be of still more value if any one would dredge in the Channel, and ascertain whether there were any submarine outliers of gravel from which the flints could be derived. Lastly, he would suggest an inquiry into the megalithic monuments of Cornwall. The origin of the "Hurlers" at Liskeard and the "Merry Maidens" at Penzance was unknown, and it would be interesting to collect anything relating to them which tradition yet retained.

CAMBRIDGE

Philosophical Society, May 30.—The president (Professor Cayley) in the chair. New Fellow elected, F. S. Barff, M.A., Christ's College. Communications made to the Society.—1. By Professor Miller, F.R.S.: On the Invention of the Camera Lucida by Wollaston. 2. By Mr. H. G. Seeley, F.G.S. (1) On the Frontal Bone in the Ornithosauria; with additional evidence of the structure of the hand in Pterodactyles from the Cambridge Upper Greensand. (2) Note on a new species of Plesiosaurus from the Portland Limestone.

DUBLIN

Natural History Society, June 1.—W. Andrews, M.R.I.A., in the chair. Dr. A. W. Foot read some notes on the different insects captured by him during the present spring. He remarked on the lateness of the season and on the paucity of insects coming to sugar; and in giving a list of insects taken at Kilkenny, expressed the hope that a large number of local collections would be made throughout Ireland, stating that if such were sent to the Museum of the Royal Dublin Society, they would be arranged in the cabinet of Irish insects in that collection, and thus in time material for a catalogue of Irish insects be obtained. Mr. A. Andrews took the chair, while Mr. W. Andrews read a paper on the Crustacea of the West Coast of Ireland. While it was his intention at an early meeting of the next session of the Society to give a complete list of all the Crustacea met with by him on this part of Ireland, including the minute forms, he wished for the present to mention the occurrence there of three species of *Nebalia*, of *Pagurus lævis*, *P. ulidianus*, the latter with ova, of *Pilumnus hirtellus*, *Portunus longipes*, this latter quite new to Ireland, and met with at the entrance to Dingle Bay in fifty fathoms of water, and on a shingly bottom, and of a species of *Galathea* which he regarded rather as a *Munida*. He had taken an immense number of rare minute Crustacea, also many Echinoderms, such as *Echinocyamus pusillus* living, *Spatangus purpureus*, *Ophiura alba*, and young *Echinus lividus*, or at least something very like it, at fifty fathoms depth. Further notices of all these species he would reserve for another occasion. Professor Macalister remarked on the interest of the paper, and said that from the sample of it given now, the paper promised for next session will be of great value, many of the species alluded to being rare. Professor Macalister exhibited a specimen of *Ommastrephes* from the Cape of Good Hope, which if not one of Le Sueur's species, was probably undescribed. A vote of thanks was then passed to the Royal Irish Academy for so kindly accommodating the Society with the use of their house during the past session, after which the chairman adjourned the Society until the first Wednesday in November next.

Royal Geological and Royal Zoological Societies, June 8.—John Barker, M.D., in the chair. The Rev. M. H. Close read a paper "On some Corries and their Rock-basins in Kerry;" the object of which was to demonstrate, if possible, what is still denied by some, the considerable erosive power of a corry glacier. On account of its smallness (its mean diameter being only 550 ft.) the well displayed basin in massive unfaulted rock, in the mountain hollow called Coom Keagh, a well-known glacier site near Dingle, peremptorily disclaims all the explanations hitherto suggested for such physical features, save that of glacial action. The water in the basin is 42 ft. deep, and the mean height of the rock-barrier above the water is 10 ft. The glacier must have removed at least 52 ft. of rock from the site of the basin, and doubtless more, since the rock basin is due only to the difference between the erosion at its middle part and at the rock barrier. The Rev. Professor Haughton and Professor Hull took part in the discussion on this important paper.—Professor R. H. Traquair, M.D., read a paper "On the scales of *Calamoichthys calabaricus*." He described the external hard parts of this fish, including the scales, fin-rays, and those cranial bones which have external "ganoid" surfaces, in this supplementing as well as somewhat correcting the description of Dr. Smith. Especial attention was given to the scales; their whole surface is covered with closely-set punctures, rather irregularly placed towards the centre and anterior superior angle, but assuming a regular arrangement in concentric and also radiating lines on the posterior inferior part of the scale. The microscopical structure of the scale corresponds with what is seen in *Polypterus*. The scales are of an osseous substance, with numerous lacunæ. Vascular canals enter from the attached surface, and then form a complex network which communicates by minute branches with the punctures in the external aspect. The form of the scales on different parts of the body was also alluded to, and some deviations observable on some specimens from the usual regular arrangement of the scales in oblique bands were also described.—Professor Macalister, M.D., then read some letters addressed to the late Dr. Croker respecting a singular mode of reproduction of the Marsupials. The writers were Mr. Williams, M.R.C.S., and Mr. G. T. Lloyd, of Geelong; and after asserting that all the knowledge at present existing on the subject of the reproduction of the kangaroo was erroneous, proclaimed as an important discovery that the young kangaroo was developed from a little mass of mucus which exuded at certain seasons from the nipple of the mother. The Chairman, in calling for a discussion on this correspondence, stated that the actual transit of the young animal from the uterine cavity to the maternal pouch had never yet been proved. [We cannot refrain from expressing our regret that the members of two learned societies could be found to listen to such absolute nonsense as was contained in these letters, and that a professor of zoology in an ancient university, himself a distinguished anatomist, could be persuaded to be the medium of presenting it to such or any audience. As to the remarks of the Chairman, who we think ought to have stopped the reading of the letters, need we say that they are in contradiction to the facts observed by the late Earl Derby's father, or by the present Professor Owen.]—Professor R. Ball read an interesting letter from a friend in Bristol referring to the birth in the Zoological Gardens of that city of a second litter of four tiger cubs. Of the first litter of four, only one survived; and of the present litter all the cubs were more or less malformed and delicate. In Dublin the tigress has never had any offspring, while the lionesses have been most prolific, and their cubs are uniformly perfect and healthy. The societies then adjourned to the next session.

Royal Dublin Society, May 23.—Prof. Dyer in the chair. Prof. R. Ball, M.A., read "An Account of Experiments on the Mechanical Efficiency of the Differential Pulley-block and Epicycloidal Pulley-block."—Dr. T. Emerson Reynolds read a paper "On a Series of Mineralogical Tables."

Royal Irish Academy, May 23.—The Rev. J. H. Jellett, B.D., president, in the chair. Dr. R. M'Donnell read a paper "On a New Theory of Nervous Action, as regards the Propagation of Sensation along Nerves." This memoir will be published in the Transactions of the Academy.—A paper by Mr. Hardinge was read, "On an ancient seal of the diocese of Ossory, and on some coins found near the Boyne."—The following were declared duly elected members of the Academy:—A. FitzGibbon, C.E., E. Hutchins, and John Kelly, of University College, Calcutta.

BERLIN

Royal Prussian Academy of Sciences, March 14.—Prof. Dove read a communication on the diffusion of heat in the Polar Sea, and on the cold of the early part of the present year, the latter accompanied by tables.

March 31.—Prof. Helmholtz communicated a memoir by M. N. Baxt on the velocity of transmission of excitation in the motor nerves of man, containing the results of several series of experiments.—Prof. Hofmann read a paper on substituted melamines, in which he described the following compounds—trimethylmelamine, triamylmelamine, and triphenylmelamine. He confirmed his previous supposition that the substituted melamines are not the direct products of the desulphuration of the sulphur-compounds of urea, but that this formation is preceded by that of the substituted cyanamides. Prof. Hofmann also communicated a memoir by himself and M. Otto Olshausen on the isomers of cyamuric ether, in which the authors describe the cyanætholine of Cloëz, and a series of experiments on the production of the cyanuric ethers of the methylic, ethylic, amylic, and phenylic series.—Prof. W. Peters read a paper on the affinity of the *Ctenodactyli* to the chinchillas and other groups of rodents, in which he stated that the African genera *Ctenodactylus* and *Pectinator* differ in all essential points from the jerboas (*Dipus*), and agree rather with *Chinchilla*, and *Octodon*, or *Echinomys*, whilst they show some tendency towards the *Muriuæ*.

April 7.—Prof. Rammelsberg read a paper on the position of thallium in the series of elementary bodies. He described several salts of thallium, such as the iodates and periodates, the chlorides, bromides and iodides of thallium and their double salts, and referred to the isomorphism of the salts of thallium with those of potassium (rubidium and ammonium) as shown especially by the researches of Des Cloiseaux. He stated that although both physically and chemically thallium is a metal, it presents a combination of characters in its compounds which renders its precise location difficult. Prof. Poggendorff noticed a new form of electrical machine, upon which he promised full details at a future meeting of the Academy.

April 28.—A memoir by Dr. P. Groth on the relation between crystalline form and chemical constitution in some organic compounds, was communicated by Prof. G. Rose. The author remarked upon the failure hitherto experienced in all attempts to apply the theory of isomorphism to organic compounds, and stated that he adopted a new method of investigation, which consisted in ascertaining the nature of the change produced in a given crystalline form by the access of a definite atom or atomic group replacing hydrogen. He described a long series of experiments, which lead him to conclude that there are atoms and atomic groups, which, by substitution, alter the crystalline form of a body only in a certain direction. This change he proposes to call "morphotropism," and he indicates the different modes in which the "morphotropic force" may be modified in action.

German Chemical Society, June 13.—Prof. Hofmann has employed his method for taking vapour-densities, to control the formulæ of several organic compounds. Sulphuretted methylic aldehyde (or what has been considered as such) is $C_3 H_6 S_3$. The vapour-density taken in xylidine-vapour was found to be 70-72° instead of 69° required by the theory. The corresponding ethyl compound was found to be $C_6 H_{12} S_3$. It is more volatile than the methylic compound. Chinone (prepared from benzidine instead of aniline, the former giving a better result) has the formula $C_6 H_4 O_2$, and not the double formula which has been lately proposed for it. He then showed a fine specimen of anthrachinone prepared by Messrs. Hopkins and Williams of London.—M. Schlebusch has prepared some derivatives of camphoric acid, and of camphor, notably tetranitro-camphor.—W. Thomsen, who has lately published views on the connection of the basicity of an acid, and the heat developed by its combination with water, draws conclusions from this theory as to the basicity of silicic, hydrofluoric, and fluosilicic acids.—L. Henry described chloroiodides of ethylene, and of allyl.—A. Kekulé described the properties of crotonic acid prepared from aldehyde, from oil of mustard, and from cyanide of allyl; the latter two being identical. The former melts at 72°, boils at 184°·7 C., and crystallises in the monoclinoëdric system.—M. Daube has extracted the colouring principle of the curcuma-root. He gives to it the formula $C_{10} H_{10} O_3$, and the name curcumin.—W. Knop has published a preliminary notice of the action of sulphuric acid and alcohol on albumen.

GÖTTINGEN

Royal Society of Sciences, January 5.—A paper, by M. Max Nöther, on Algebraical Surfaces which may be represented by plane figures, was communicated by M. A. Clebsch.

January 19.—MM. W. Marmé and A. Creite communicated a paper on the Physiological Action of the Alcoholic Extract of *Cynoglossum officinale*. The authors deny that this extract acts in the manner of curare, as stated by some Russian writers; they describe its action as that of a narcotic, and state that it causes death by paralysing the respiratory centre. Dr. Rudolph Fittig communicated some further researches upon the constitution of piperic acid, in which he described several of its derivatives. Professor Wöhler noticed the analysis of the supposed meteoric iron of the Collina di Brianza, by Dr. Haushofer, who had stated that he found in it both nickel and cobalt, the presence of which was denied by previous analysts. The author had analysed a portion of this iron, and had also applied to Professor Rose for an analysis of the fragments in Berlin; no trace of cobalt or nickel was detected by them. Dr. Haushofer's analysis was probably made from a fragment of true meteoric iron.

February 16.—M. Clebsch communicated a memoir, by M. S. Lie, on the relations of reciprocity of Reyé's complex. Dr. Rudolph Fittig read a paper on Tetramethylbenzole, in which he described a new solid hydrocarbon, having the formula ascribed to tetramethylbenzole [$C_{10} H_{14} = C_6 H_2 (C H_3)_4$]. For this he proposed the name of *durole*, and he described two of its compounds, namely, *dinitrodurole* and *dibromodurole*.—Professor A. Enneper read a paper on an enlargement of the idea of parallel surfaces.

March 16.—Professor Kohlrausch communicated a memoir, by M. E. Riecke, on the replacement of a system of galvanic currents existing upon a surface by a distribution of magnetic masses.—Professor Henle communicated some zoological observations made at Naples by Dr. Alexander Stuart, of Odessa. The author described the development of new individuals in a colony of *Collozoum inerme*, which takes place by a process of gemmation. He confirmed his former statement that the cilia of *Coscinosphæra* are composed of calcareous crystals. With regard to the medusa-brood of *Velella spirans*, the author stated that all the tissues of the polypary take part in their formation, and that at an early period they possess a body cavity distinct from that of the stomach, which is afterwards filled up with connective tissue, so as to leave only the canals of the water-vascular system. He noticed the occurrence of something which he regards as a digestive passage in the *Gregarinæ* of the earthworms, and briefly described the nervous system of *Creseis acicula*, in which he found a ganglionic œsophageal ring and dorsal and ventral ganglia, each of the latter emitting nervous stems.

DIARY

THURSDAY, JUNE 23.

ZOOLOGICAL SOCIETY, at 8.30.—On the Walrus: Dr. J. Murie.—Catalogue of the Mammals of South China and Formosa: Mr. R. Swinhoe.—On a Collection of Birds from the Island of Trinidad: Dr. O. Finsch.

SUNDAY, JUNE 26.

SUNDAY LECTURE SOCIETY, at 8.—Cruelty in relation to the Lower Animals: Dr. T. S. Cobbold, F.R.S.

MONDAY, JUNE 27.

ETHNOLOGICAL SOCIETY (Extra Meeting), at 8.—On the opening of the Park Cwm Tumulus: Sir John Lubbock, Bart.—On the opening of Grim's Graves, Norfolk: Rev. Canon Greenwell.—On the discovery of Platycnemic Men in Denbighshire: W. B. Dawkins and Prof. Busk.

LONDON INSTITUTION, at 4.—Botany: Prof. Bentley, F.R.S.

WEDNESDAY, JUNE 22.

SOCIETY OF ARTS, at 4.—Anniversary Meeting.

BOOKS RECEIVED

ENGLISH.—Woolhope Naturalists' Field Club: Report for 1869.—Remarks on Synonyms of European Spiders, No. 1: T. Thorell (Williams and Norgate.)

FOREIGN.—(Through Williams and Norgate).—Bericht über die Fortschritte der Anatomie und Physiologie im Jahre 1869: Henle, Meissner und Grenacher.—Die Ophthalmologische Physik und ihre Anwendung auf die Praxis: Dr. H. Gerold.—Nouveaux éléments de Physique Médicale: Desplats et Gabriel.—Die Bierbrauerei und die Dickmaischbrauerei: P. Heiss.—Etude sur les Diatomacées: Ch. Manoury.—Die Land und Süsswasser Conchylien der Vorwelt: Dr. Sandberger.

CONTENTS

PAGE
THE UNIT OF LENGTH 137
MUSEUMS OF NATURAL HISTORY 138
OUTLINES OF HUMAN PHYSIOLOGY 139
OUR BOOK SHELF 139
LETTERS TO THE EDITOR:—
  The Corona.—Dr. B. A. GOULD 141
  Euclid as a Text-Book.—R. TUCKER 141
  The Interior of the Earth.—H. P. MALET 141
  Prismatic Structure in Ice.—Rev. T. G. BONNEY. 141
  Etna in Winter.—W. H. CORFIELD 142
  Paraplegia in Kangaroos.—Dr. J. YOUNG 143
  Geology and the Chatham Dockyard.—R. C. HART. 143
  Dust and Disease.—E. L. LAYARD 143
HEINRICH GUSTAV MAGNUS. By A. OPPENHEIM. (*With Portrait.*) 143
RECENT ADDITIONS TO THE ZOOLOGICAL SOCIETY'S GARDENS. By P. L. SCLATER, F.R.S. (*With Illustrations.*) 146
NOTES 148
MR. MELDRUM ON THE ORIGIN OF STORMS IN THE BAY OF BENGAL . 151
CHEMISTRY: SPECIFIC GRAVITIES OF AQUEOUS SOLUTIONS 151
SCIENTIFIC SERIALS 152
SOCIETIES AND ACADEMIES 152
DIARY AND BOOKS RECEIVED 156